

CLAIMS

1. A liquid-cooling type cooling plate, comprising:

at least one flat multi-bored tube through which cooling liquid
5 passes;

a substrate having two header forming dented portions arranged
apart from each other and a tube accommodating dented portion for
accommodating the tube, the tube accommodating dented portion being
formed between the header forming dented portions; and

10 a cover plate disposed on an upper surface of the substrate,
wherein an upper surface of the cover plate and/or a lower
surface of the substrate is configured to be attached by a member
to be cooled,

wherein the tube is accommodated in the tube accommodating
15 dented portion with the tube communicated with the header forming
dented portions,

wherein the tube is disposed between the substrate and the
cover plate and an opening of each header forming dented portion
is closed by the cover plate in a state in which the cover plate
20 is disposed on the upper surface of the substrate, whereby two header
portions are formed, and

wherein the substrate, the tube and the cover plate are
integrally jointed such that leakage of the cooling liquid
accommodated in the header portions can be prevented.

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2. The liquid-cooling type cooling plate as recited in claim
1, wherein the substrate, the tube and the cover plate are integrally

brazed.

3. The liquid-cooling type cooling plate as recited in claim 1 or 2, wherein an average equivalent diameter of a cooling liquid passage of the tube is set so as to fall within the range of from 0.05 to 1.7 mm.

4. The liquid-cooling type cooling plate as recited in claim 1 or 2, further comprising a first connecting member connected to one of the two header portions and a second connecting member connected to the other header portion, wherein the first connecting member and the second connecting member are configured to be connected to a cooling liquid inlet tube and a cooling liquid outlet tube, respectively.

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5. The liquid-cooling type cooling plate as recited in claim 3, further comprising a first connecting member connected to one of the two header portions and a second connecting member connected to the other header portion, wherein the first connecting member and the second connecting member are configured to be connected to a cooling liquid inlet tube and a cooling liquid outlet tube, respectively.

6. The liquid-cooling type cooling plate as recited in claim 1, wherein the member to be cooled is an electronic component for electric vehicles.

7. The liquid-cooling type cooling plate as recited in claim 1, wherein the member to be cooled is an electronic component for computers.

5 8. A method for manufacturing a liquid-cooling type cooling plate, the method comprising:

a step of preparing at least one flat multi-bored tube through which cooling liquid passes, a substrate having two header forming dented portions arranged apart from each other and a tube
10 accommodating dented portion for accommodating the tube, the tube accommodating dented portion being formed between the header forming dented portions, and a cover plate disposed on an upper surface of the substrate;

a step of accommodating the tube in the tube accommodating
15 dented portion with the tube communicated with the header forming dented portions,

a step of disposing the cover plate on the upper surface of the substrate after the step of accommodating the tube such that the tube is disposed between the substrate and the cover plate and
20 an opening of each header forming dented portion is closed by the cover plate, whereby two header portions are formed, and

a step of integrally jointing the substrate, the tube and the cover plate after the step of disposing the cover plate such that leakage of the cooling liquid accommodated in the header portions
25 can be prevented.

9. The method for manufacturing a liquid-cooling type cooling

plate as recited in claim 8, wherein in the jointing step, the substrate, the tube and the cover plate are integrally brazed in a brazing furnace.

5 10. The method for manufacturing a liquid-cooling type cooling plate as recited in claim 8, further comprising a step of jointing connecting members in which a first connecting member to be connected to a cooling liquid inlet tube is connected to one of the two header portions and a second connecting member to be
10 connected to a cooling liquid outlet tube is connected to the other header portion,

 wherein in the jointing step, the substrate, the tube, the cover plate and the connecting members are integrally brazed in a brazing furnace.

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 11. The method for manufacturing a liquid-cooling type cooling plate as recited in any one of claims 8 to 10, wherein an average equivalent diameter of a cooling liquid passage of the tube is set so as to fall within the range of from 0.05 to 1.7 mm.

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 12. An electric vehicle equipped with a liquid-cooling type cooling plate in which an electronic component as a member to be cooled is attached to an upper surface of a cover plate and/or a lower surface of a substrate of the liquid-cooling type cooling
25 plate,

 wherein the liquid-cooling type cooling plate includes:

 at least one flat multi-bored tube through which cooling liquid

passes;

the substrate having two header forming dented portions arranged apart from each other and a tube accommodating dented portion for accommodating the tube, the tube accommodating dented portion
5 being formed between the header forming dented portions; and

the cover plate disposed on an upper surface of the substrate, wherein an upper surface of the cover plate and/or a lower surface of the substrate is configured to be attached by a member to be cooled,

10 wherein the tube is accommodated in the tube accommodating dented portion with the tube communicated with the header forming dented portions,

wherein the tube is disposed between the substrate and the cover plate and an opening of each header forming dented portion
15 is closed by the cover plate in a state in which the cover plate is disposed on the upper surface of the substrate, whereby two header portions are formed, and

wherein the substrate, the tube and the cover plate are integrally jointed such that leakage of the cooling liquid
20 accommodated in the header portions can be prevented.

13. The electric vehicle as recited in claim 12, wherein the substrate, the tube and the cover plate are integrally brazed.

25 14. The electric vehicle as recited in claim 12 or 13, wherein an average equivalent diameter of a cooling liquid passage of the tube is set so as to fall within the range of from 0.05 to 1.7 mm.

15. The electric vehicle as recited in claim 12 or 13, wherein the liquid-cooling type cooling plate further includes a first connecting member connected to one of the two header portions and a second connecting member connected to the other header portion, wherein the first connecting member and the second connecting member are configured to be connected to a cooling liquid inlet tube and a cooling liquid outlet tube, respectively.

16. The electric vehicle as recited in claim 14, wherein the liquid-cooling type cooling plate further includes a first connecting member connected to one of the two header portions and a second connecting member connected to the other header portion, wherein the first connecting member and the second connecting member are configured to be connected to a cooling liquid inlet tube and a cooling liquid outlet tube, respectively.

17. The electric vehicle as recited in claim 12 or 13, wherein the electric vehicle is further equipped with a radiator, wherein cooling liquid cooled by the radiator is introduced into the cooling plate, and the cooling liquid flowed out of the cooling plate is cooled by the radiator.

18. The electric vehicle as recited in claim 14, wherein the electric vehicle is further equipped with a radiator, wherein cooling liquid cooled by the radiator is introduced into the cooling plate, and the cooling liquid flowed out of the cooling plate is cooled

by the radiator.